
Water Quality Program

The CALFED Water Quality Program goal is to provide good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses. The water quality program includes programmatic actions to reduce water quality degradation from agricultural drainage, urban and industrial runoff, acid mine drainage, wastewater and industrial discharges, and natural sources. This Program focuses on reducing the release of pollutants into the Bay-Delta system and its tributaries. Reducing the total pollutant load entering the Delta will provide benefits for all water users. These include improved drinking water quality, reduced salt load for agricultural diversions, and improved water quality for the ecosystem, including reduced toxicity. The Water Quality Program recognizes that additional benefits can be obtained by managing the timing release of remaining pollutant discharges and other dilution actions.

Geographic Scope of the Program

The geographic scope of the CALFED water quality problem area is the legally defined Delta. CALFED is developing the strategy to resolve water quality problems within this area that affect beneficial uses of the estuary. Included in this strategy is the intent to resolve water quality problems for certain species (e.g., anadromous fish) that inhabit the Delta but may be impacted at different life stages by conditions outside of the Delta. In resolving the water quality problems of the Delta, CALFED may undertake actions throughout its geographic solution area, as necessary.

Water Quality Parameters of Concern

Parameters of concern are constituents that cause water quality problems by affecting beneficial uses of water, or are indicators of water quality problems. The parameters of concern for the CALFED water quality program were identified with the assistance of technical experts from public agencies, private industry, and representatives of the public. Collectively, agricultural, urban, environmental, industrial and recreational interests are represented by this group. The parameters of concern to CALFED include metals and trace elements (cadmium, copper, mercury, and zinc), pesticides and other synthetic organic chemicals (carbofuran, chlordane, chlorpyrifos, diazinon, toxaphene, DDT, PCBs), minerals and nutrients (total dissolved solids, chloride, bromide, nitrates), physical characteristics (pH, temperature), toxicity and pathogens (viruses, bacteria, protozoa).

Sources of Water Quality Problems

Sources of water quality problems in the Delta and its tributaries include:

- acidic drainage from inactive and abandoned mines that introduces metals such as zinc, cadmium, copper, and/or mercury;
- stormwater inflows and urban runoff that may contribute selenium, turbidity,

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- pathogens, organic carbon, nutrients, pesticides, and/or other chemical residues;
 - municipal and industrial discharges that may contribute salts, trace elements, nutrients, metals, pathogens, chemical residues, oil and grease, and/or turbidity;
 - agricultural tail water, or return flows, that may contribute salts, nutrients, pesticide residues, pathogens, and/or turbidity; and,
 - subsurface agricultural drainage that may contribute salts, nutrients, pesticides (some fungicides), selenium, and/or other trace elements.

Action Strategies to Address Water Quality Problems

Action strategies have been developed by the Water Quality Program to address water quality problems in the Delta and its tributaries. The strategies are recommended actions to reduce loadings from the sources of water quality problems (e.g., mine drainage, agricultural drainage, urban and industrial runoff, and municipal and industrial wastewater treatment facilities), to improve source water quality; to upgrade water treatment plants, or to change water management practices.

Action strategies to address water quality problems include a combination of research, pilot studies and full-scale actions. For some parameters, such as mercury, there is little understood about its sources, the bioavailability of the various sources, and the load reductions needed to reduce fish tissue levels. For this parameter further study is recommended before full-scale actions are taken. For other parameters, such as selenium, sources are better documented, and source control or treatment actions can be taken with a reasonable expectation of positive environmental results. The actions that follow highlight some of the major strategies that make up the Water Quality Common Program. A complete listing of actions can be found in the CALFED Water Quality Common Report.

Delta

Actions strategies to address water quality problems in the Delta address urban and industrial runoff, municipal and industrial wastewater, agricultural drainage, and source control and treatment. Following is a description of the main action strategies for each of these sources.

Mine drainage actions will reduce mercury loadings to the Delta from abandoned and inactive mines. These actions include source control and treatment measures. Actions for mercury occur throughout the basin and are primarily being addressed through a system-wide research-program that will attempt to identify bioavailable forms of mercury, sources of the bioavailable forms and an action plan to reduce the loadings of these forms. Pilot scale actions are recommended for mines that drain mercury to Cache Creek and the Yolo Bypass.

Urban and industrial runoff actions will help to reduce toxicity from the pesticides chlorpyrifos and diazinon, copper, and oxygen depletion in the Delta, and to reduce pathogens. Actions include both source control and treatment measures.

Municipal and industrial discharge actions will help to reduce pathogens and oxygen depletion. These actions include source control and treatment measures including improved management of boat discharges and additional source control or treatment at wastewater treatment plants.

Agricultural drainage actions will reduce toxicity from the pesticide carbofuran, chlorpyrifos, and diazinon in the Delta. Actions are primarily source control measures such as best management practices (BMPs).

Actions to improve the quality of drinking water sources include relocation of water supply intakes to avoid areas of high salinity, total organic carbon, and turbidity.

Actions to improve drinking water quality include upgrades to treatment processes to improve disinfection while reducing production of unwanted disinfection byproducts.

Actions to address unknown toxicity focus on development of a comprehensive monitoring, assessment, and research program to identify toxicities, the sources of these toxicities, and action plans to address unknown toxicity in the Delta and its tributaries.

Sacramento Basin

Action strategies in the Sacramento Basin predominantly include mine drainage actions with some agricultural drainage and urban and industrial runoff actions. Following is a description of the main action strategies for each of these sources.

Mine drainage actions will reduce mercury, cadmium, copper, and zinc loadings to the Sacramento River and its tributaries from abandoned and inactive mines. These actions include point source and non-point source measures. Actions for cadmium, copper, and zinc are focussed at mine sites that drain into the upper Sacramento River. Actions for mercury occur throughout the basin and are primarily being addressed through a system-wide research-program to identify bioavailable forms of mercury, sources of the bioavailable forms and an action plan to reduce the loadings of these forms.

Urban and industrial runoff actions will reduce toxicity of the pesticide chlorpyrifos and diazinon in the Sacramento River and its tributaries from urban areas. These actions will include implementation of pesticide usage BMPs in urban areas.

Agricultural drainage actions will reduce toxicity from the pesticides carbofuran, chlorpyrifos, and diazinon in the Sacramento River and its tributaries from agricultural areas. Actions are primarily source control measures such as best management practices (BMPs), especially from farm areas that drain to the Feather River, Colusa Basin Drain, and mainstem Sacramento River.

Actions to address unknown toxicity focus on development of a comprehensive monitoring, assessment and research program to identify toxicities, the sources of these toxicities, and action plans to address unknown toxicity in the Sacramento River and its tributaries.

San Joaquin Basin

Action strategies in the San Joaquin Basin predominantly include agricultural drainage actions with limited mine drainage actions. Following is a description of the main action strategies for each of these sources.

Subsurface agricultural drainage discharged to the San Joaquin River from the Grasslands area are perhaps the most significant cause of water quality problems, specifically selenium and salinity (TDS, chloride, bromide), in the River. CALFED agricultural drainage actions include drainage reduction and reuse, timed drainage release, drainage treatment to reduce trace elements and other contaminants, salt separation and utilization and land use changes to reduce drainage quantities. Agricultural drainage actions will reduce toxicity from the pesticides chlorpyrifos and diazinon in the San Joaquin River and its tributaries from agricultural areas. Actions are primarily source control measures such as best management practices (BMPs) particularly in farm areas that drain to Mud and Salt sloughs, and the San Joaquin River.

Actions to address mine drainage associated with loadings of cadmium and zinc to the San Joaquin Basin (specifically the Mokelumne River) have been undertaken as part of the Penn Mine Remediation Plan. However, mercury loadings continue to be a problem in the basin. Actions for mercury occur throughout the basin and are primarily being addressed through a system-wide research-program that will attempt to identify bioavailable forms of mercury, sources of the bioavailable forms and an action plan to reduce the loadings of these forms.

Actions to address unknown toxicity focus on development of a comprehensive monitoring, assessment and research program to identify toxicities, the sources of these toxicities, and action plans to address unknown toxicity in the San Joaquin River and its tributaries.

Water Quality Targets

Numerical or narrative water quality targets have been developed for each parameter of concern. These targets relate to acceptable in-stream concentrations of parameters. They will be used to gauge action and alternative effectiveness at protecting beneficial uses. Targets are based on Water Quality Control Plans (Basin Plans) of the Bay Area and Central Valley Regional Water Quality Control Boards or U.S. Environmental Protection Agency National Toxics Rule objectives, standard agricultural water quality objectives, and acceptable source drinking water quality ranges as defined by technical experts.

Performance Targets

Performance targets have been established to measure the effectiveness of actions in improving water quality. Performance targets are generally stated as load reduction levels. For example, the target for copper in the Sacramento River may be to reduce copper loadings in the Upper Sacramento River from 30,000 pounds to 5000 pounds per year. For actions that recommend

further parameter study or research the target will be a focussed outcome. For example, if research is required to identify sources of mercury the outcome should be a list of the top ten most important sources along with an action program to address these sources.

Comprehensive Monitoring, Assessment and Research Program

The Water Quality Program, and indeed all CALFED activities, must be based on the application of rigorous science. While there is some information on the existence of water quality problems in the CALFED solution area, much is yet to be learned. CALFED is developing a Comprehensive Monitoring, Assessment, and Research Plan (CMARP) to address the need for adequate scientific support not only in the water quality area, but also for the system integrity, ecosystem restoration, and water supply reliability resource areas. The CMARP is central to the CALFED philosophy of adaptive management. The water quality component of the CMARP will provide for:

- Establishing a quality assurance/quality control program to assure the scientific validity of CALFED data collection;
- Establishing the actual existence and severity of water quality problems, including evaluating the ecosystem effects of water quality parameters;
- Establishing baseline water quality conditions against which CALFED actions will be measured; and,
- Evaluating the effectiveness of CALFED water quality improvement actions and identifying the need for adaptive management actions.

Coordinated Watershed Approach

CALFED may work with local agencies to assist in the formation of alliances and cooperative projects to improve water quality for beneficial uses on a larger scale than might be possible with local agencies working alone or in more narrowly scoped programs. CALFED's system-wide watershed focus on water quality will help to better integrate and coordinate State/Federal resource management programs with local watershed activities, while ensuring long-term benefits for the Bay-Delta estuary.

CALFED activities are being coordinated with existing or new watershed management programs affecting the Bay-Delta system including, but not limited to, the State Water Resources Control Board's Sacramento River Watershed Program, the Sacramento River Toxic Parameter Control Program, the San Joaquin Valley Drainage Implementation Program, the San Francisco Estuary Project Comprehensive Conservation and Management Plan and the federal, State, and Regional Water Quality Control Board's Watershed Management Initiative Programs.

Appendix B provides detailed descriptions of the water quality programmatic actions together

with targets for their implementation and potential indicators of success. Individual programmatic actions may vary in cost, technical feasibility, and other respects that would affect the final choices for implementation of actions. These will, therefore, be subjected to pre-feasibility analysis to determine which programmatic actions are most appropriate to be carried forward toward implementation. This work will begin in Phase II of the CALFED program, and will continue into Phase III. Full feasibility analysis in conjunction with project-specific environmental documentation will be performed in Phase III.

Water Use Efficiency Program

The Water Use Efficiency Program reflects California's well accepted public policy, that places a strong emphasis on efficient use of developed water supplies. At CALFED scoping sessions, participants expressed a strong sentiment that water use efficiency should figure prominently in all the CALFED alternatives, and that existing supplies must be used efficiently before undertaking costly efforts to develop additional supplies or improve the ability to convey water across the Delta.

Many local water agencies in California have strong water use efficiency programs. The greatest current challenge in water use efficiency is finding ways to encourage more water users and water suppliers to implement proven cost-effective efficiency measures that are being used successfully by their peers throughout the state.

The term efficiency may be defined in different ways. Increases in physical efficiency and increases in the achievement of CALFED objectives through improved water management would be direct results of the water use efficiency program. Increasing economic efficiency -- which might result in a reallocation of water -- is not a specific objective of the Program but would likely be an indirect result.

The CALFED water use efficiency program differs from other components of proposed Bay-Delta solution alternatives in two fundamental ways: it is concerned with policy, not technical issues, and **most actions would be implemented by local agencies rather than CALFED agencies.**

Implementation objectives were established in order to guide the development of approaches for water use efficiency. These objectives are intended to reflect and protect the various stakeholder interests regarding local water use management and efficiency. The objectives were used during program development to test whether a draft approach was satisfactory. There are general objectives as well as specific objectives for urban water conservation and agricultural water use efficiency. General objectives include:

- Ensure a strong water use efficiency component in the Bay-Delta solution.
- Emphasize incentive based actions over regulatory actions.
- Preserve local flexibility.
- Remove disincentives and barriers to efficient water use.
- Offer greater help in the planning and financing of local water use management and

Appendix B

Water Quality Program

Programmatic Actions

Action Strategies To Address Parameters of Concern

Action strategies have been developed to address water quality problems in the Delta and its tributaries. The strategies are recommended actions to reduce parameter loadings from the sources of water quality problems (e.g., mine drainage, agricultural drainage, urban and industrial runoff, and municipal and industrial wastewater treatment facilities), to improve source water quality; to upgrade water treatment plants, to identify unknown toxicities, or to change water management practices.

Individual programmatic actions may vary in cost, technical feasibility, and other respects that would affect the final choices for implementation of actions. Actions will therefore be subjected to pre-feasibility analysis to determine which programmatic action are most appropriate to be carried forward toward implementation. This work will begin in Phase II of the CALFED program, and will continue into Phase III. Full feasibility analysis in conjunction with project-specific environmental documentation will be performed in Phase III.

Programmatic water quality actions can be generally categorized as source control, treatment, or water management. Following are the actions recommended by the Water Quality Common Program, along with performance measures and indicators of success. More detailed information on the expected benefits and constraints associated with these actions can be found in the Water Quality Common Program Report.

Mine Drainage

Action

Reduce toxic effects of cadmium, copper, and zinc loadings to the Delta and its tributaries by source control or treatment of mine drainage at inactive and abandoned mine sites. Action targeted at the Upper Sacramento River and tributaries to the Upper Sacramento River that are major contributors of copper, cadmium and zinc loadings.

Methods

- Source control methods include capping tailings piles, removing tailings piles, diverting water courses from metal sources, sealing mines, removing contaminated sediments, and similar measures to prevent metals from leaching or draining into water bodies.
- Treatment methods involve collecting and treating mine drainage to remove metals and neutralize acidity.

Performance measure

- Reduction in annual copper loadings (during an average water year) to the Upper Sacramento River from approximately 65,000 pounds to 10,000 pounds.

Indicator of success

Achievement of Basin Plan objectives for cadmium, copper and zinc in the Sacramento River above Hamilton City.

Action

Reduce toxic effects of mercury loadings to the Delta and its tributaries by source control and/or treatment of mine drainage at inactive and abandoned mine sites.

Methods

- Development of a system-wide research program to identify bioavailable forms of mercury, sources of the bioavailable forms and an action plan to reduce loadings of these forms to the Delta and its tributaries.
- Development of pilot scale projects to determine feasibility of mercury contaminated sediment cleanup. Recommend action be targeted at the Cache Creek and its tributary watersheds.
- Treatment of mercury contaminated mine drainage. Recommend action be targeted at the Cache Creek Watershed and Mt. Diablo mine areas.

Performance measures

- Improved understanding of sources and mechanisms of mercury bioaccumulation in the Delta.
- Improved understanding of the cost/benefit associated with remediation of mercury contaminated sediment.
- A targeted action plan that specifies selection and prioritization of actions to remediate mercury loadings to the Delta and its tributaries.
- Reduction in mercury loadings to Cache Creek.

Indicators of success

- Achievement of US EPA 304(a) guideline for mercury in the Delta and its tributaries.
- Removal of fish health advisories.

Urban and Industrial Runoff**Action**

Reduce toxic effects of copper, zinc and cadmium loadings to the Delta and its tributaries from urban and industrial runoff

Methods

- Enforcement of existing source control regulations.
- Provision of incentives for additional source control of urban and industrial runoff, particularly those areas that have runoff associated with vehicle usage.

Performance measure

- Improved understanding of the sources and mechanisms for bioaccumulation of cadmium, copper, and zinc in the Delta.

- Reduction in copper loadings at selected stormwater monitoring stations.

Indicator of success

- For copper and zinc achievement of Basin Plan objectives in the Delta and Sacramento River and its tributaries, US EPA 304(a) guidelines in the San Joaquin River and its tributaries
- For cadmium achievement of Basin Plan objectives in the Sacramento River and its tributaries and west of Antioch Bridge in the Delta, US EPA 304(a) guidelines in the San Joaquin River and its tributaries and east of Antioch Bridge in the Delta.

Action

Reduce toxicity from the pesticides chlorpyrifos and diazinon in the Delta and its tributaries through source control of urban and industrial runoff.

Methods

- Enforcement of existing source control regulations
- Provision of source control incentives, such as additional education for homeowners on pesticide usage and incentives for pesticide users to increase implementation of best management practices including integrated pest management.

Performance measure

- Improved understanding of the toxicity and sources and mechanisms of chlorpyrifos and diazinon transport into the Delta.
- Reduced toxicity at selected stormwater monitoring locations measured by improved survivability from a three-species test.

Indicator of success

- Reduced toxicity from chlorpyrifos and diazinon in the Delta and its tributaries.

Action

Reduce the toxic effects of nutrient loadings and consequently, oxygen depletion in the Delta and its tributaries through source control of urban and industrial runoff.

Methods

- Enforcement of existing source control regulations including implementation of best management practices.
- Provision of incentives for additional source control including best management practices and better planning of new developments (e.g., design of storm drainage systems that target maximum infiltration of stormwater into the ground or on-site or regional stormwater sedimentation facilities that detain the majority of stormwater for at least 8 hours, etc.) and public education.

Performance Measure

- Improved understanding of the sources and mechanisms for nutrient transport in the Delta.
- No measurable impacts to fish from low dissolved oxygen levels in the Lower San Joaquin River.

Indicator of Success

- Achievement of Basin Plan objectives for dissolved oxygen in the Delta and its tributaries, particularly in the Lower San Joaquin River.

Action

Reduce the impacts of sediment loading, and subsequent turbidity to the ecosystem of the Delta and its tributaries and to urban drinking water sources in the Delta, through source control of urban and industrial runoff.

Methods

- Better enforcement of existing source control regulations for construction sites. May include development of ordinances and other measures.
- Education of construction personnel on impacts of construction site discharges.

Performance Measure

- Decreased turbidity levels at Delta water supply intakes.
- Increased juvenile anadromous fish production in areas downstream of new developments on Delta tributaries where anadromous fish are known to spawn.

Indicator of Success

- Achievement of a 50 NTU monthly median at drinking water intakes.
- Achievement of Basin Plan objectives for turbidity.

Wastewater and Industrial Discharges**Action**

Reduce the impact of domestic wastes and hence pathogens to Delta urban drinking water supplies and recreational water uses, from boat discharges within the Delta and Delta tributaries.

Note: The Bay-Delta has 241,000 registered boats and 80 marinas. Bacterial pollution from one boat is equivalent to the effluent from 10,000 people whose sewage passes through a treatment plant. Regulatory standards do not currently exist to measure achievement of environmental target.

Methods

- More extensive enforcement of boat domestic waste discharge regulations.
- Extensive boater education campaigns.
- Installation of more extensive, better, and more economical pumpout stations.
- Installation of more public toilet facilities.

Performance Measure

- Quantifiable records from pumpout facilities that show increased usage by boaters. Usage should match expected boater domestic waste quantities.
- Number of public workshops and other outreach activities.
- Number of new pumpout and toilet facilities installed.

Indicator of Success

- Reduced bacteriological counts in marinas and other recreational areas.

- Lower pathogen levels near water supply intakes.

Action

Reduce the toxic impacts of oxygen depleting substances and copper and mercury loadings to the Delta through cost effective source control and treatment of industrial and municipal wastewater discharges. Action for oxygen depleting substances should be targeted at the Lower San Joaquin River and copper and mercury loadings at the Suisun Bay and Carquinez Straight area.

Methods

- Increased incentives for industries to pre-treatment discharges containing copper and mercury.
- Incentives for municipal wastewater effluent reclamation and reuse.
- Treatment of a portion of upstream municipal wastewater effluent in wetlands.

Performance Measures

- Reduction in nutrient loadings from Delta municipal wastewater treatment facilities.
- Reduction in copper and mercury loadings from Delta wastewater treatment plants.

Indicator of Success

- Achievement of Basin Plan objectives for dissolved oxygen in the Lower San Joaquin River.
- Achievement of applicable Basin Plan objectives or US EPA 304(a) criteria for copper and mercury in the Delta.

Action

Reduce the toxic impacts of selenium loadings to the Delta through source control and treatment of industrial discharges. Action should be targeted at industries that discharge selenium to the Suisun Bay and Carquinez Straight area.

Method

- Additional treatment of oil refinery discharges in the western Delta for selenium removal.

Performance Measure

- Reduced selenium loadings to the western Delta

Indicator of Success

- Reduced tissue bioaccumulation of selenium in aquatic organisms of the western Delta.

Agricultural Drainage

Action

Reduce the toxic effects of selenium loadings to the Lower San Joaquin River and Delta by controlling sources of selenium in agricultural sub-surface drainage.

Methods

- Change use of lands that are major sources of selenium through voluntary landowner participation and by compensated arrangements to reduce drainage volumes.

- Reduce drainage flows through increased water use efficiency.
- Treat drainage for selenium removal.

Performance Measure

- Reduced selenium loadings from the Grassland area of the San Joaquin River watershed.

Indicator of Success

- Reduced selenium concentrations in the San Joaquin River near Vernalis, where the River flows into the Delta.

Action

Reduce salinity impacts to Delta urban and agricultural source water quality through source control and treatment of agricultural surface and sub-surface drainage in the San Joaquin River watershed.

Methods

- Improved source irrigation water quality in sub-surface drainage areas.
- Concentration and safe disposal of agricultural drainage in evaporation ponds.
- Treatment of agricultural drainage by reverse osmosis, constructed wetlands, or by other means.
- Time agricultural drainage discharges to coincide with periods when dilution flow is sufficient to achieve water quality target ranges for salinity.

Performance Measures

- Reduced salinity loads entering the San Joaquin River from adjacent lands.

Indicators of Success

- Reduced salinity in the San Joaquin River near Vernalis, where the River flows into the Delta.

Action

Reduce salinity for agricultural source water in the South Delta through improved outflow patterns and water circulation in the Delta.

Methods

- Construct one or more tide gates, wiers, dams or sills at the head of Old River and possibly other southern Delta locations to manage drainage flows, tidal currents and stages in the San Joaquin and Middle River and interconnecting channels.
- Relocate Delta island drainage to more efficiently route salinity to the Bay and ocean.
- Provide dilution water for salinity control. (This measure would be considered as one possible means of mitigating salinity impacts of other CALFED actions, if such mitigation were necessary.)

Performance Measures

- Reduced salinity loads entering southern Delta channels.

Indicator of Success

- Reduced total dissolved solids in the southern reaches of the Old and Middle Rivers.

Action

Reduce the toxic effects of carbofuran, chlorpyrifos, and diazinon in the Delta and its tributaries through source control of agricultural surface drainage and Delta island drainage.

Method

- Incentives and/or enforcement of existing regulations.
- Incentives for pesticide users to increase implementation of best management practices including integrated pest management and grower education.

Performance Measures

- Reduction of toxicity in Delta channel waters.

Indicator of Success

- Improved survival of test organisms in three-species toxicity bioassays, and indications through the toxicity identification evaluation testing that pesticides are not a significant cause of toxicity in Delta channels.
- Achievement of Basin Plan objectives for carbofuran when they are promulgated.

Action

Reduce the toxic effects of ammonia entering the Delta and its tributaries through source control of agricultural surface drainage.

Method

- Provide incentives for implementation of best management practices at dairies, other animal operations, and fertilized lands in the watersheds that discharge into the Delta, including the North Bay, and the lower reaches of the Sacramento and San Joaquin Rivers, and westside stream tributaries to the Delta.

Performance Measures

- Reduced toxicity due to ammonia in Delta channels and lower reaches of its tributary streams.

Indicator of Success

- Improved survival of test organisms in three-species toxicity bioassays, and indications through the toxicity identification evaluation testing that ammonia is not a significant cause of toxicity in Delta channels.
- Achievement of US EPA 304(a) guidelines for ammonia in the Delta and its tributaries.

Action

Reduce the toxic effects of ammonia entering the Delta and its tributaries from waste water treatment plant discharge through improved treatment.

Method

- Provide incentives for improved waste water treatment facilities and processes.

Performance Measure

- Reduced toxicity due to ammonia in Delta channels and lower reaches of its tributary streams.

Indicator of Success

- Improved survival of test organisms in three-species toxicity bioassays, and indications

through the toxicity identification evaluation testing that ammonia is not a significant cause of toxicity in Delta channels.

Water Treatment

Action

Improve treated drinking water quality (including reduction in formation of disinfection by-products) through treatment to reduce concentrations of total organic carbon, pathogens, turbidity, and bromides.

Methods

- Incentives for the addition of enhanced coagulation, ozone, granular activated carbon filtration and/or membrane filtration facilities to the water systems treating water from the Delta.

Performance Measures

- Reliably meet current and future drinking water standards.

Indicator of Success

- Absence of waterborne disease outbreaks and quantitative evidence of treatment success by measures such as bacteria counts, pathogen counts, and measurements of organic carbon, disinfection byproducts, and turbidity.

Action

Improve total organic carbon, pathogens, turbidity and bromides at domestic water supply intakes.

Method

- Relocate water supply intakes to areas that are not influenced by those discharges.

Performance Targets

- Total organic carbon concentrations 3.0 mg/L (quarterly average).
- Bromide concentrations of 50ug/L (quarterly average).
- Turbidity less than or equal to 50 NTU (monthly median).
- Total dissolved solids less than 220 mg/L (10 year average), or less than 440 mg/L (monthly average).
- Protozoa (Giardia, Cryptosporidium oocysts) less than 1 oocyst/100 L (annual average).

Indicators of Success

- Existing modern, well operated treatment plants can successfully and reliably meet current and future drinking water standards without the need to significantly upgrade facilities.
- Absence of waterborne disease outbreaks and quantitative evidence of treatment success by measures such as bacteria counts, pathogen counts, and measurements of organic carbon, disinfection byproducts, and turbidity.

Unknown Toxicity

Action

Identify and implement actions to address potential toxicity to water and sediment within the Delta and its tributaries.

Method

- Conducting toxicity testing and toxicity identification evaluations and/or other appropriate methods.
- Coordinate efforts with monitoring programs being conducted by others..

Performance Measure

- Numbers of toxicity bioassays and Toxicity Identification Evaluation test conducted.

Indicator of Success..

- Successful identifications of causal agents of toxicity in the channels of the Delta estuary.

Water Management

Action

Reduce the concentration of salinity entering the Delta and its tributaries during low flow periods.

Methods

- Acquiring dilution water from willing sellers.
- Provision of incentives for more efficient water management of dams, including reservoir re-operation.
- Urban water conservation. Conservation might be achieved through use of incentives for implementation of best management practices by more suppliers and water users. Implementation of the action may reduce demand for existing water and may make dilution water available (including transfers), especially on the San Joaquin River
- Greater use of reclaimed wastewater (e.g., recharge groundwater, treated agricultural drainage, use for agricultural irrigation, recycling and treating for potable or non-potable urban, use of grey water, and storage for use in meeting X2 standards). Reclamation programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water that are not reusable.
- Enhanced seasonal recharge.
- Development of additional groundwater supplies.

Performance Target

- Reduced salinity loads to the Delta.

Indicator of Success

- Reduced concentrations of total dissolved solids, chloride, and bromide in the San Joaquin River near Vernalis, where the River flows into the Delta.

COMMON PROGRAMS

Four programs will be common to the three major alternatives. Each program consists of a number of programmatic actions. The programs include:

- Ecosystem Restoration Program - includes actions designed to improve habitat and to promote a diverse and stable ecosystem in the Bay-Delta.
- Water Quality Program - includes actions to reduce parameter load entering the Bay-Delta system.
- Water Use Efficiency Program - includes policies and actions designed to increase water use efficiency.
- Levee System Integrity Program - includes actions to improve the stability of levees throughout the Delta.

Preliminary write-ups on the impacts of selected actions are analyzed in the following report sections.

QUESTIONS REGARDING ECOSYSTEM RESTORATION PROGRAM PLAN

1. The summary of the ecosystem restoration program plan programmatic actions provided by EIS team leader (doc 1) does not match with information contained in ERPP executive summary and tables working draft dated April 8, 1997 (doc2). Which should be used for impact analysis? Neither the habitat types nor the acreages match.
2. Example of above - Doc 1 indicates 33,000-45,000 acres of tidal perennial aquatic habitat and tidal emergent wetlands in delta. Doc 2 indicates 7,000 acres.
3. Another example - Doc1 indicates 75-220 miles of riparian restoration in delta.. Doc 2 indicates 25-45 miles.
4. Would tidal perennial habitat be mostly open water?
5. Need to confirm that tidal perennial habitat, tidal emergent wetlands and freshwater emergent wetlands would all be created by flooding islands and by moving levees landward to restore flow to dead-end sloughs and peninsulas, and to widen channels.
6. How would riparian habitat be created along delta channels? Can trees, etc, be planted on levees? If not, would a setback levee be built making the old levee available for planting?
7. Need to confirm that seasonal wetland habitat would be available for agriculture most of the year.